Chapter 5 Notes 03/10/2015

- Studying Memory
  - Models play a large role in memory research
  - Modal Model of Memory:
    - Sensory memory – an initial stage that holds all incoming information for seconds or fractions of a second
    - Short-term memory – holds 5-7 items for about 15-30 seconds.
    - Long term memory – can hold a large amount of information for years or even decades.
  - Memory systems includes a control process – active processes that can be controlled by the person and may differ from one task to another.
    - EX: Rehearsal – repeating a stimulus over and over to remember it (repeating a telephone number over and over)
    - The process of storing something in long term memory is called **encoding**
    - The process of remembering info that is stored in LTM is **retrieval**

- **Sensory Memory**
  - The retention, for a brief period of time, of the effects of sensory stimulation.
- The Sparklers Trail and the Projector's shutter
  - The sparkler appears to have a light trail left behind the sparkler as you wave it in motions - in reality, the lighted trail is a creation of your mind, which retains a perception of the sparkler's light for a fraction of a second.
  - Persistence of vision – the retention of the perception of light in your mind.
  - Same thing applies with movies.. we are not seeing a constantly moving scene rolling across the screen. Instead, a frame arrives in front of the lens, the lens then closes, and then a new frame is presented. This happens so fast (24 times per second) that we do not see the dark spots because of the persistence of vision.
- Sperling's experiment: measuring the capacity & duration of the sensory store
  - The experiment flashed a matrix of 12 letters on the screen for 50 milliseconds and then asked the participants to report as many of the letters as possible → this is known as the whole report method. The results showed that participants reported and average of 4.5 of the 12 letters.
    - Sperling could have concluded that the participants only saw 4.5 letters because the exposure was brief, but there is another explanation.
    - Perhaps participants saw most of the letters immediately after they were presented, but their perception faded rapidly as they were reporting the letters, so by the time they had reported 4-5 letter, they could no longer see the matrix or remember the letters.

- He devised a partial report method to test which hypothesis is correct. In this partial report, participants were to report a certain row of letters after hearing a certain tone.
- When cue tones directed participants to focus their attention on one of the rows, they got the letters correct 82% of the time.
- He also did a delayed partial report method and found that when cue tones were delayed for 1 second after the flash, participants were able to report only slightly more than 1 letter in a row.
- Sperling concluded that a short-lived sensory memory registers all or most of the info that hits our visual receptors, but that this info decays within less than a second.
- Iconic memory (or visual icon) – brief sensory memory for visual stimuli.
- *Sensory memory can register huge amount of info, but it retains if for only seconds.

Short Term Memory

- The system involved in storing small amounts of information for a brief period of time.
- Recall test – participants are presented with stimuli then, after a delay, are asked to remember as many stimuli as possible.

What is the duration of Short-term memory? (Peterson & Peterson)

- Remembering three letters experiment: the experimenter says three letters followed by some number, and the task is to remember the 3 letters. When the participant hears the number, they repeat it and start counting backwards by 3s from that number. (EX: if experimenter says ABC 20, then participant says 20-17-14-11). After a period of time, the participant is asked to recall the 3 letters.
- Peterson and Peterson found that memory of the letters faded because of decay – memory trace decayed because of the passage of time.
- Keppel and Underwood suggested that the drop-off in memory was due to proactive interference – interference that occurs when info that was learned previously interferes with learning new info.
    - EX: This might happen when a frequently used phone number has changed – you try really hard to remember the new one but the older information tends to interfere.
- The outcome of these studies shows that when rehearsal is prevented, the duration of STM is about **15-20 seconds**.

What is the capacity of STM?

- Digit Span – the number of digits a person can remember
- According to measurements of the digit span, the typical STM is about 5-9 items.
    - "Seven, plus or minus two"

- So if the STM is so limited, how is it possible to hold many more items in memory in some situations, as when words are arranged in a sentence?
- Miller & chunking:
    - Chunking – several small units can be arranged into larger meaningful units, like phrases, or even larger units, like sentences, paragraphs, or stories.
    - Chunk – a collection of elements that are strongly associated with another but are weakly associated with elements in other chunks.
    - Chunking allows us to increase our memory span to 20 words or more.
- Other examples of chunking:
    - An experienced chess player and an new chess player were shown a chess position for 5 seconds each… the experienced chess player was able to correctly place 16/24 pieces on the board as compared to the new chess players 4/24 correct. This was not due to the fact that the experienced chess player had a better STM, but that he was able to chunk the pieces together to remember their positions.

- How is information coded in STM?
    - Coding – refers to the way info is represented.
    - Physiological approach to coding – determining how a stimulus is represented by the firing of neurons
    - Mental approach to coding – asking how a stimulus or an experience is represented in the mind.
- Auditory Coding
    - Auditory coding involves representing items in STM based on their sound.
    - Conrad's experiment – participants saw a number of target letters flashed briefly on a screen and were told to write down the letters in the order they were presented. Conrad found that participants made errors by misidentifying the target letter as another letter that sounded like the target.
        - From these results Conrad concluded that the code for STM is auditory.
- Visual coding
    - Involves representing items visually, as would occur when remembering the details of a floor plan or the layout of streets on a map.
    - Della Sala did an experiment in which the participants were given a pattern of squares where some squares were shaded in, and some where white. The participants were able to look at the pattern for 3 seconds, then presented with a full matrix of white squares and asked to duplicate the pattern. The matrices could be anywhere from 4 -30 squares in size.